

Wire Insulation Incorporating Self-Healing Polymers (WIISP), Phase II

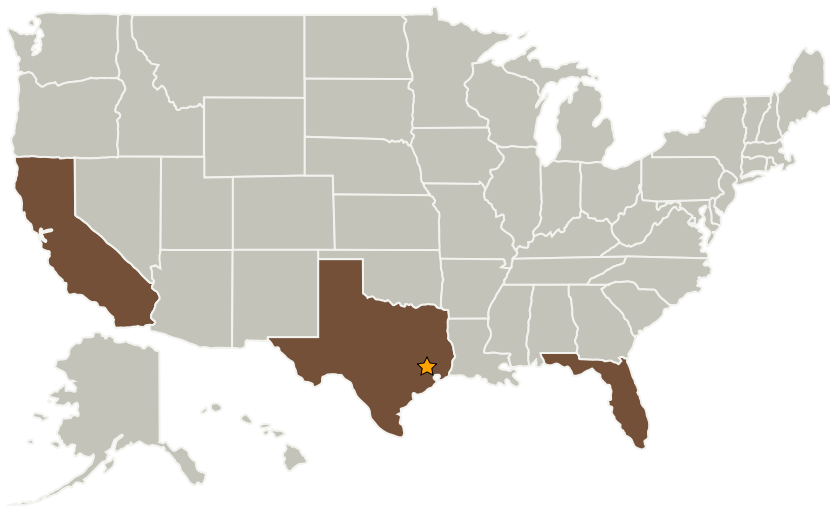
Completed Technology Project (2006 - 2008)



Project Introduction

NextGen and Virginia Tech are developing a self-healing material for wire insulation using a class of ionomeric polymers. These ionomers exhibit self-healing properties as a function of the ionic content of the material. Previous work has focused on self-healing of puncture damage caused by projectiles, has shown that an airtight seal can be formed in real time seconds after the puncture has occurred. Since self-healing has already been demonstrated, the major technical challenge of this effort is to stimulate the localized melt elastic response that has been shown to initiate self-healing. Our concept is to incorporate a magnetically-responsive phase into the insulating polymer using magnetic flux particle alignment to induce localized heating during high-frequency excitation of the polymer. Tuning the frequency of the electrical signal to the critical frequency of the polymer associated with the glass transition temperature will produce localized heating of the insulation. Localized heating, initiated by a wiring damage event such as arcing, will cause flow into the crack and, upon cooling, the crack will close over the wire and eliminate the exposure of the bare wire. With proper arrangement of nanoparticles the impact on material property can be minimized, while site-specific self-healing can be demonstrated.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
NextGen Aeronautics, Inc.	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Torrance, California

Primary U.S. Work Locations

California	Florida
Texas	

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.3 Thermal Protection Components and Systems
 - └ TX14.3.1 Thermal Protection Materials